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Patent Application
Docket No. 34650-569PT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of: Anders Borgstrom, Magnus Hollström, and Torbjörn Gärdenfors

For: METHOD AND SYSTEM FOR USING AN ELECTRONIC READING DEVICE AS A GENERAL APPLICATION INPUT AND NAVIGATION INTERFACE

BOX PATENT APPLICATION
Assistant Commissioner
for Patents
Washington, D.C. 20231

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PATENT APPLICATION TRANSMITTAL LETTER

Transmitted herewith for filing, please find the following:

X Specification, claims and abstract of the above-referenced patent application (total of 60 pages)

X 9 sheet(s) of drawing(s) (__formal/ x informal).

X Combined Declaration and Power of Attorney (unexecuted).

__ An Assignment of the invention to: Telefonaktiebolaget LM Ericsson (publ)

__ A verified statement claiming small entity status under 37 CFR 1.9 and 1.27.

X Other (specify): Acknowledgment postcard.

__ This application is a:

- __ Continuation
- __ Divisional
- __ Continuation-In-Part

of prior copending parent application Serial No. _____filed on _____ now pending.

Please amend the application to insert the following line in the beginning of the specification:

--This application is a Continuation of prior application Serial No. _____filed on _____, now pending.--

In the event that a petition to extend time under 37 CFR 1.136 is necessary in the parent application to maintain copendency for this application, a petition for an extension of the necessary time to maintain copendency is hereby requested for the parent application and the Commissioner is hereby authorized to debit our Account Number 10-0447 for the necessary fees.

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INDEPENDENT CLAIMS	**2-3**	**0**	**$80**	**0**
MULTIPLE DEPENDENT CLAIM(S) PRESENTED			**$260**	
TOTAL FEES:				**$908**
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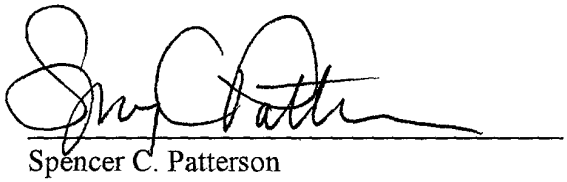

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METHOD AND SYSTEM FOR USING AN ELECTRONIC READING DEVICE AS A GENERAL APPLICATION INPUT AND NAVIGATION INTERFACE

REFERENCE TO EARLIER FILED PROVISIONAL APPLICATIONS

This patent application claims the benefit of priority from, and incorporates by reference the entire disclosure of, co-pending U.S. Provisional Patent Application Serial Nos. 60/182,742, filed on February 16, 2000, 60/190,343, filed on March 16, 2000, and 60/192,662, filed on March 28, 2000.

CROSS REFERENCE TO RELATED APPLICATION

The present application for patent is related to and hereby incorporates by reference the subject matter disclosed in U.S. Patent Application Serial Nos.

_____ (Attorney Docket No.34650-566PT), entitled "Specially Formatted Paper Based Applications of a Mobile Phone"; _____ (Attorney Docket No.34650-578PT), entitled "Predefined Electronic Pen Applications in Specially Formatted Paper"; _____ (Attorney Docket No. 34650-579PT), entitled "A System and Method for Operating an Electronic Reading Device User Interface"; _____ (Attorney Docket No. 34650-601PT), entitled "Method and System for Using an Electronic Reading Device on Non-paper Devices"; _____ (Attorney Docket No. 34650-602PT), entitled "Multi-layer Reading Device"; _____ (Attorney Docket No. 34650-604PT), entitled, "Method and System for Configuring and Unlocking an Electronic Reading Device"; _____ (Attorney Docket No. 34650-606PT), entitled "Printer Pen"; _____ (Attorney Docket No. 34650-607PT), entitled "Method and System for Electronically Recording Transactions and Performing Security Function"; _____ (Attorney Docket No. 34650-608PT), entitled "Electronic Pen with Ink On/ink off Function and Paper Touch Sensing"; _____ (Attorney Docket No. 34650-654PT), entitled "Method and System for Handling

FIFO and Position Data in Connection with an Electronic Reading Device"; _____ (Attorney Docket No. 34650-655PT), entitled "Hyperlink Applications for an Electronic Reading Device"; _____ (Attorney Docket No. 34650-656PT), entitled "Measuring Applications for an Electronic Reading Device"; _____ (Attorney Docket No. 34650-657PT), entitled "Method and System for Controlling an Electronic Utility Device Using an Electronic Reading Device"; and _____ (Attorney Docket No. 34650-658PT), entitled "Positioning Applications for an Electronic Reading Device"; and _____ (Attorney Docket No.34650-673PT), entitled "Method for Sharing Information Between Electronic Reading Devices"; and in U.S. Provisional Patent Application Serial Nos. _____ (Attorney Docket No.34650-671PL), entitled "Electronic Pen for E-Commerce Implementations"; and _____ (Attorney Docket No.34650-672PL), entitled "Electronic Pen Help Feedback and Information Retrieval"; all filed concurrently herewith.

BACKGROUND OF THE INVENTION

Technical Field of the Invention

The present invention relates in general to the communications field, and in particular to an interaction of an electronic reading device with an address pattern.

Description of Related Art

Numerous devices exist for accepting user input and controlling user interaction with desktop and portable computers, personal digital assistance (PDAs), mobile phones, and other types of electronic devices. For example, a keyboard can be used to accept typed input and other types of commands, a mouse or a track-ball can be used to provide relative motion input as well as various types of point-and-click selections, a keypad can be used to provide input of numerical data and functional commands, navigational keys can be used for scrolling lists or otherwise repositioning a cursor, various types of touchpads or touchscreens can be used to provide absolute positional coordinate inputs, and a gamepad can be used for PC and console gaming. Each type of mechanism for accepting input and for supporting user interaction has benefits and disadvantages in terms of size,

convenience, flexibility, responsiveness, and easy of use. Generally, the selection of a particular type of input mechanism is dependent upon the function of the application and the degree and type of interaction required.

With the ever expanding capabilities and availability of applications both on the Internet and the area of wireless technology, there continues to be a need to develop and provide new mechanisms for accepting input and interacting with users. In particular, some of the existing technologies suffer from drawbacks or limitations, such as size and flexibility, that make them impractical and/or inconvenient to use in some situations. Furthermore, a device application MMI is limited by the physical capabilities of the device. Having several different means of input and navigation for different devices results in higher product costs and a longer learning curve. Language problems can also result from having standardized keyboards, for example. By expanding the range of mechanisms for supporting user interaction, application developers and end-users can have greater flexibility in the selection of input devices. Preferably, any such new mechanisms will provide increased

flexibility and will maximize user convenience. In addition, the development of new mechanisms for interacting with users can expand the realm of potential applications.

For example, while a keyboard typically provides a great deal of flexibility, particularly when it is used in connection with a mouse, a touchscreen, or other navigational device, its size makes it inconvenient in many cases, especially in the wireless context.

SUMMARY OF THE INVENTION

The present invention comprises a method and system for controlling an electronic device. One or more control functions of the electronic device are represented by fields on a specially formatted surface. In particular, the specially formatted surface includes an address pattern. A reading device detects a portion of the address pattern that is adjacent to the reading device. Using the detected portion, a substantially precise location of the reading device relative to the address pattern can be determined. Moreover, by detecting multiple consecutive positions, substantially precise movements of the reading device can also be determined.

If the position and/or movements of the reading device are determined to be within a control field of the specially formatted surface, a corresponding control function can be identified and performed on the electronic device.

Using such a configuration, a number of control functions can be executed using the reading device in connection with the specially formatted surface, such as text input, drawing input, navigation, joystick functions and other special functions. These functions can be performed on any type of electronic device capable of communicating with the reading device, including a personal computer (PC), mobile phone, PDA, and the like. Furthermore, by providing a selection or "click" means, particular fields or parts of fields on the specially formatted surface can be selected. Such a selection means can include, for example, a pressure-sensitive means on the reading device, a click button on the reading device, or a detection by the reading device of a portion of a selection field.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, reference is made to the following detailed description taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a block diagram of a system in which an electronic pen can be used as an input device;

FIGURE 2 is a schematic diagram of a system for supporting use of the electronic pen described in connection with FIGURE 1;

FIGURE 3 is an illustration of the protocol stacks that can be used in the case of local communications between an electronic pen and an electronic pen client;

FIGURE 4 is an illustration of protocol stacks that can be used when an electronic pen and an electronic pen client communicate with one another via an Internet connection;

FIGURE 5 is an illustration of a protocol stack for communications between an electronic pen client and each of the supporting entities when the electronic pen client is not located within a server on the Internet;

FIGURE 6 is an illustration of protocol stacks that are used for communications between an electronic pen

client and each of the supporting entities when the electronic pen client is located on the Internet;

FIGURE 7 is a block diagram of the electronic pen logic that handles positions, strokes, actions, and grid descriptions;

FIGURE 8 is a block diagram of a state machine for the electronic pen control block shown in FIGURE 7;

FIGURE 9 is a block diagram of a state machine for an electronic pen client;

FIGURES 10A-10C are a message flow and signaling diagram illustrating the operation of the electronic pen system shown and discussed in connection with FIGURE 2;

FIGURE 11 illustrates an example of a specially formatted paper for PC navigation and input;

FIGURE 12 depicts an illustrative example of a specially formatted paper for cellular phone navigation and input; and

FIGURE 13 is an illustration of an electronic pen used in performing an advanced joystick functionality.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a system in which an electronic reading device, such as an electronic pen, an

electronic mouse, or a hand scanner, works in cooperation with an address pattern (e.g., a specially formatted paper) to provide for a detection of a location of the electronic reading device over the address pattern. For instance, a pattern of dots can be defined such that, by examining a very small portion of the pattern, a precise location in the overall pattern can be determined. In fact, it is possible to define a pattern that has the size of 73,000,000,000,000 A4 pages, which is equivalent to half the size of the entire United States. Portions of the pattern can be placed on sheets of paper or other objects.

Then, using an electronic scanner pen that can detect the dots in the pattern, it is possible to detect the location of the pen with respect to the unique pattern. For example, when such a pen is used in connection with a specially formatted paper, the pen can detect its position (e.g., using a built in camera) by detecting a 3 mm by 3 mm portion of the pattern. By taking approximately 100 pictures per second, the pen is capable of determining its exact position to within 0.1 mm or less. This system can be used to provide user input, to facilitate user interaction, or to store handwritten notes or drawings. Moreover, by associating portions of the overall pattern

with certain applications, such a system can be used to interact with wide variety of applications.

Referring now to FIGURE 1, there is illustrated an example of a system 2 in which an electronic pen 10 can be used as an input device. The electronic pen 10 includes an ink cartridge and is capable of writing in a typical fashion. The electronic pen 10, however, includes some type of sensor (e.g., a built-in camera) that is used for detecting an address pattern on a specially formatted piece of paper 12. In particular, the paper 12 is formatted with a small portion of a large address pattern such that when the electronic pen 10 is used to write on or otherwise make marks on the paper 12, the writings or markings can be electronically detected and stored.

As an example, the paper 12 might constitute a form that can be used for sending an e-mail. Thus, the paper 12 might include a space for writing in the e-mail address of an intended recipient, a space for writing a subject of the e-mail, and a space for writing the body of the e-mail. As the electronic pen 10 is used to fill in each of the spaces, the position and movement of the electronic pen 10 on the paper 12 can be determined by repeatedly detecting the current x, y coordinates of the pen 10

(e.g., at rate of 100 frames per second). The markings can then be converted into ASCII text using an appropriate handwriting recognition program. Once the user completes the form, the e-mail can be sent, for example, by checking a send box at a predetermined location on the paper 12.

Preferably, the coordinate information collected by the pen 10 is sent by a short range radio transmitter in the electronic pen 10 to a nearby mobile station 14 using a short range radio interface 16 such as a local wireless radio link (e.g., a local wireless radio link supported by Ericsson's Bluetooth™ wireless communications technology). Alternatively, instead of using a mobile station 14, the coordinate information could also be sent to, for instance, a desktop or portable computer, a personal digital assistant (PDA), a television, or a Bluetooth terminal. Moreover, instead of using a local wireless radio link, other types of local wireless links, such as inductive coupling and infrared light; other types of radio links, such as Global System for Mobile Communication (GSM); or wired transmission media, such as a cable can also be used. The information can then be forwarded via an appropriate link, such as a cellular air interface 18, to a base station 20 or other network node.

Referring now to FIGURE 2, there is illustrated a schematic diagram of a system 2 for supporting use of the electronic pen 10 described in connection with FIGURE 1. Throughout the subsequent discussion, the system 2 is described primarily in connection with an electronic pen 10. It will be understood, however, that the invention and the underlying system 2 can instead use any type of electronic reading device, such as an electronic pen, an electronic mouse, or a hand scanner. As shown in FIGURE 2, the system 2 includes six different entities, including the electronic pen 10, the electronic pen client 22, a control node 24, a name server 26, a base translator 28, and an application server 30. Although these various devices are described and depicted separately, it is also possible to combine two or more of the entities into the same device (e.g., the electronic pen 10 and electronic pen client 22 can be contained in the same device).

The electronic pen 10 is responsible for detecting positions on the address pattern, producing actions, and sending information to the electronic pen client 22. In addition to being able to leave pen markings, some electronic pens can also have the ability to produce other types of output, such as sound, vibration, or flashing

lights. The electronic pen 10 includes a memory for storing a current grid, which comprises information relating to an area of the address pattern that is near the most recently detected position of the electronic pen 10. When the electronic pen 10 is loaded with the current grid, it knows what actions to take based on the positions that are read from the address pattern. When the electronic pen 10 is first turned on or when it moves to an area outside of the current grid, the electronic pen 10 must first request a new grid description before it can continue processing information. In such a situation, the electronic pen 10 requests a new grid description from the electronic pen client 22.

The electronic pen client 22 can be located in a mobile station 14, in a PDA, in a desktop or portable computer, in the electronic pen 10 itself, in a server somewhere on the Internet, or in another device. The electronic pen client 22 serves as the center of communications in the overall system 2. In particular, the electronic pen client 22 receives new grid requests and action requests from the electronic pen 10 and responds to these requests by contacting an appropriate entity within the overall system 2 to properly respond to

the request from the electronic pen 10. Furthermore, when the electronic pen 10 is being used in connection with a particular application, the electronic pen client 22 can store the application and/or any corresponding data received from the electronic pen 10 to facilitate processing and use of the application.

The name server 26 is used for translating a detected position on the address pattern into a Uniform Resource Location (URL) associated with that position. Different portions of the address pattern are assigned to different applications. Neither the electronic pen 10 nor the electronic pen client 22, however, is aware of all of the different applications and the particular areas assigned to each application. Thus, when the electronic pen 10 detects a new or unknown position, it forwards the position information to the electronic pen client 22, which in turn sends the information to the name server 26. The name server 26 then identifies an application associated with the received position and retrieves a URL where a description of the particular application can be found. The retrieved URL can then be used by the electronic pen client 22 to retrieve the application description.

As an alternative, the name server 26 can comprise a global name server that keeps track of a location, in the form of URLs to local name servers, where more information can be found about different addresses in the pattern. Similarly, each local name server can use other local name servers to obtain the necessary information, i.e., to convert a position into a URL where an application description can be found. At the lowest level, the local electronic pen client should know all the paper addresses that are within a specific application or applications.

There are some services that should be available in the overall system 2 for which it is inconvenient or not feasible to support such services in the electronic pen 10 or the electronic pen client 22. In such a case, the base translator 28 can be used to support the services. For example, the base translator 28 might contain handwriting recognition software for converting pen actions into text or for converting pen actions into a predefined set of symbols. When such services are needed, the electronic pen client 22 can send a request to the base translator 28 along with the necessary data, and the base translator 28 can perform the requested service.

Another entity in the system 2 is a control node 24. The control node 24 is used for responding to actions in a standardized way. For example, the control node 24 can be used to respond to certain generic functions, such as "cancel" or "submit" functions, in a consistent manner without regard to the particular application that is currently active.

In addition, the control node 24 is used for creating streaming-like applications. For instance, some applications might require that the positions on the address pattern that are detected by the electronic pen 10 be immediately sent, upon detection, to the electronic pen client 22 for use by the application (i.e., the electronic pen 10 does not wait to transmit the position data until a complete stroke is detected or until a "send" field is touched). One example is an application that is used to control an industrial robot in a warehouse. In such a case, the application description that is loaded onto the electronic pen server 22 can include instructions that all positions be streamed to a control node 24. As a result, the control node 24 can receive the positions in real time and can control the robot without waiting for the form (i.e., the current grid) to be completed. Thus, the

control node 24 can perform a real-time translation from detected positions to a responsive action, such as moving an object (e.g., a robot, a valve, etc.) or controlling a process.

The application server 30 is a regular web or wireless application protocol (WAP) server that supports an application associated with a particular area of the address pattern. The application server 30 stores an application description and provides the application description to the electronic pen client 22 upon request. In addition, the application server 30 receives input data from the electronic pen 10 via the electronic pen client 22. For example, the application description might define a number of data entry areas on a form. Thus when data is entered on the form by the electronic pen 10, the data is received by the electronic pen client 22, converted into text using handwriting recognition software, and forwarded to the application server 30, which stores the data or otherwise processes the data in accordance with the function of the application.

Referring now to FIGURES 3 through 6 there are illustrated various examples of protocol stacks that can be used for communicating between the entities shown in

FIGURE 2. Generally, however, such protocols apply however, only if the two communicating entities are implemented in different devices. If two or more entities are combined into one device, a proprietary protocol can be used to communicate between the entities. FIGURE 3 illustrates the protocol stacks that can be used in the case of local communications (e.g., using Bluetooth) between the electronic pen 10 and the electronic pen client 22. If, on the other hand, the electronic pen 10 and the electronic pen client 22 communicate with one another via an Internet connection, the protocol stacks depicted in FIGURE 4 will be used. FIGURE 5 illustrates a protocol stack for communicating between the electronic pen client and each of the supporting entities, such as the name server 26, the control node 24, the base translator 28, and the application server 30, when the electronic pen client 22 is not contained within a server on the Internet (e.g., such as when the electronic pen client 22 is located in a mobile phone 14). Finally, FIGURE 6 depicts the protocol stacks that are used when the electronic pen client 22 is located on the Internet.

There are a number of procedures that can be used by the various entities in the system 2 to allow the system

to operate properly. When the electronic pen 10 detects a position on the address pattern that is not within its currently loaded grid or when the electronic pen 10 has no currently loaded grid, the electronic pen 10 initiates a new grid procedure. The new grid procedure involves sending a new grid request object to the electronic pen client 22. The new grid request object contains the newly detected position, a description of the actions that the electronic pen 10 can natively support, and a description of the output signals that the electronic pen 10 supports. The reply to a new grid request object is a grid description, which can be provided by the electronic pen client 22 from its own internal memory or from the information provided by an application server 30. Generally, the electronic pen client 22 extracts the grid description from an application description received from the application server 30. The grid description should only contain action-field-types that the electronic pen 10 has indicated that it natively supports, which means that the electronic pen client 22 in some cases should convert the extracted grid description into a format that the electronic pen 10 can understand.

In some situations, it may be necessary for the electronic pen 10 to unload its current grid at the request of the electronic pen client 22. In such a case, the electronic pen client 22 sends an empty grid description to the electronic pen 10, thereby causing the electronic pen 10 to unload its current grid. This can occur, for example, when a particular application is complete or when a new grid description request received from the electronic pen 10 cannot be fulfilled, such as when the position received from the electronic pen 10 is not registered in the name server 26.

Another similar message is the empty grid description with a grid exception. When the electronic pen 10 requests a new grid description from the electronic pen client 22, the electronic pen client 22 uses the detected position specified in the request to ask the name server 26 for a URL where the application description can be found. If no URL is returned, the electronic pen client 22 can send an empty grid description with a grid exception to the electronic pen 10. The grid exception comprises a rectangle or other shape indicating the area around the detected position where no registered applications can be found. Preferably, the indicated area

is as large as possible so that the electronic pen 10 and/or electronic pen client 22 know the extent of the surrounding area that is unassigned and do not have to repeatedly send requests to the name server 26. Thus, the empty grid description with a grid exception causes the electronic pen 10 to unload its current grid and also informs the electronic pen 10 of an area surrounding the detected position that can essentially be ignored because its is not associated with any application.

The procedure that is used when the electronic pen 10 detects a new position is a find application description location procedure. This procedure is used by the electronic pen client 22 to translate a detected position received from the electronic pen 10 into a URL where a description of an application corresponding to that position can be found. The procedure involves sending a request from the electronic pen client 22 to the name server 26 containing identification of the detected position. The name server 26 responds by sending a reply to the electronic pen client 22 containing a URL where an application description can be found or, if the detected position is not registered in the name server 26,

containing an indication that no associated application is known to exist.

Once the electronic pen client 22 knows the URL where an application description can be found, the electronic pen client 22 can initiate a get application description procedure, which allows the electronic pen client 22 to retrieve the application description from the application server 30. In particular, the electronic pen client 22 sends an application description request containing a unique ID for the requesting electronic pen 10 and/or electronic pen client 22 to the application server 30 located at the URL address provided by the name server 26. In response, the application server 30 provides an application description object to the electronic pen client 22, which loads the application onto the electronic pen client 22. The application description object is similar to an HTML form with some additions and modifications.

Furthermore, the application description object can be sent from the application server 30 to the electronic pen client 22 in response to a submitted form (i.e., a submission of one completed form might automatically result in a new form being loaded onto the electronic pen

client 22). A related procedure is the application submit procedure, which is used by the electronic pen client 22 when the user of the electronic pen 10 selects a "submit" field in a form. In response to the selection of the "submit" field, the electronic pen client 22 will submit the form content in accordance with instructions received in the application description. Typically, the electronic pen client 22 will submit the form content, in the same way as a regular web browser, to a URL specified in a form tag of the application description.

When an action that can be handled by the electronic pen 10 itself is generated, an action procedure is initiated by the electronic pen 10 to send an action request object to the electronic pen client 22. If the electronic pen client 22 cannot translate the action into a field value itself, the electronic pen client 22 further forwards the request to a base translator 28 for translating the action into a field value. In response to the action request object, an action reply object is sent from the electronic pen client 22 to the electronic pen 10. The action reply object contains output information that indicates to the electronic pen 10 which outputs signals to use. The output information, however, cannot

be of type that the electronic pen 10 has previously indicated that it does not support. In some instances, the action reply object might contain a new grid description. In such a case the electronic pen 10 will unload its current grid description and load the new grid description. Similarly, if the action reply object contains an empty grid description, the electronic pen 10 will simply unload its current grid description.

The action request object is also sometimes used to specify actions that should be processed by the control node 24. In this instance, the electronic pen client 22 initiates a control procedure by forwarding the received action to the appropriate control node 24. As a result, the control node 24 sends an action reply object to the electronic pen client 22.

The operation of the electronic pen 10 will now be discussed in greater detail. Each electronic pen 10 has a unique pen ID, which is sent to the application server 30 when an application description is requested. The electronic pen ID allows the application to identify the particular user that is using the application and to distinguish between multiple concurrent users of the same application, such as when different electronic pens 10 are

being used in connection with separate sheets of paper that each contain the same portion of the address pattern.

Referring now to FIGURE 7, there is illustrated a block diagram of the electronic pen logic that handles positions, strokes, actions, and grid descriptions for the electronic pen 10. The electronic pen 10 includes a control block 32 for controlling the operation of the electronic pen 10. A grid description block 34 represents a memory location that stores a current grid description. At any given time, the electronic pen 10 can be in either of two modes. In a first mode, a grid description is loaded, while in a second mode, the grid description block 34 is not loaded with a current grid description.

As the electronic pen 10 moves across an address pattern, the electronic pen 10 periodically (e.g., every 1/100 of a second) detects a position by detecting all of the dots within, for example, a 3mm by 3mm area. Each detected position is forwarded (as indicated at 36) to a position first in first out (FIFO) block 38, which acts as a buffer for temporarily storing the detected positions. The clocking of the position FIFO block 38 is controlled by the control block 32 (as indicated at 40).

The detected position is fed from the position FIFO block 38 (as indicated at 42) to an in grid detector 44. The in grid detector 44 retrieves data from the grid description block 34 (as indicated at 46) and determines whether the received position is within the loaded grid description. If not, the in grid detector 44 notifies the control block 32, which in turn initiates a request for a new grid. When the detected position is within the current grid, the position is then sent (as indicated at 50) from the in grid detector 44 to a stroke engine 52. The stroke engine 52 converts the received positions into strokes, which are then sent (as indicated at 54) to an action engine 56. A complete stroke is created when the electronic pen 10 is lifted from the paper or when it moves outside of the grid field where the stroke began. Finally, the action engine 56 converts the received stroke into an action that can be sent to the electronic pen client 22. By using grid action-field-types, the action engine knows which type of action to produce for a specific grid field.

Referring now to FIGURE 8, there is illustrated a block diagram of a state machine for the control block 32 shown in FIGURE 7. In this figure, events are indicated

in capital letters, while tasks associated with the event are depicted in brackets. The process starts at step 60 with a start up event 62, which causes the position FIFO block 38 to begin receiving detected positions. Initially, the electronic pen 10 is in a no grid loaded state 64, which means that the electronic pen 10 does not have a grid loaded in the grid description block 34. As a result, the control block 32 generates an outside grid indication 66, thereby causing the electronic pen 10 to send the request for a new grid description to the electronic pen client 22 (i.e., in accordance with the new grid procedure) and to stop the FIFO buffer 38. At this point, the electronic pen 10 enters a waiting for grid state 68.

Once the new grid has been received (as indicated at 70), the control block 32 moves to a grid loaded state 72, at which time the new grid is loaded into the grid description block 34 and the position FIFO block 38 resumes operation. On the other hand, if no grid is received (as indicated at 74), at least a portion of the positions stored in the FIFO buffer 38 are erased. Which part of the FIFO buffer to erase is determined by the grid exception area, if any, in the received empty grid

description. Accordingly, all positions stored in the FIFO buffer 38 that are within the grid exception area should be erased. If no grid exception is received, the stroke associated with the position is erased. In addition, the FIFO block 38 resumes operation and the control block 32 moves into the no grid loaded state 64.

When the control block 32 is in the grid loaded state 72, a current grid is loaded in the grid description block 34. While the control block 32 remains in this state 72, the position FIFO block 38 continues to receive detected positions and passes them on to the stroke engine 52 and action engine 56. Actions produced by the action engine 56 are sent (as indicated at 58) to the electronic pen client 22 (i.e., in accordance with the action procedure described above).

At some point, an outside grid indication 74 may be received by the control block 32 from the in grid detector 44. The outside grid event 74 causes the FIFO block 38 to stop generating new positions. In addition, the electronic pen 10 enters a flushing stroke and action state 76 wherein the strokes that are currently in the stroke engine 52 and the actions that are currently in the action engine 56 are flushed to the electronic pen client

22. Once the stroke engine 52 and action engine 56 have been fully flushed (as indicated at 78), the electronic pen 10 sends a request for a new grid to the electronic pen client 22 and unloads the current grid. The control block 32 then moves back into the waiting for grid state 68.

As a general matter, the electronic pen 10 may be capable of supporting various different types of output, including audio, such as warning tones; visual, such as a flashing light; tactile, such as vibration; and/or ink. In some cases, it might be desirable to allow the user of the electronic pen 10 to turn off the ink of the pen 10, such as when the electronic pen is being used on a portion of the address pattern that is public or shared or when the user wants to be able to reuse the current sheet of paper.

The electronic pen client 22 will now be described in greater detail. Generally, the electronic pen client 22 is analogous to a regular web browser. It is responsible for loading applications from application servers 30 and for handling input form the electronic pen 10. Preferably, the electronic pen client 22 is located in a separate device from the electronic pen 10 itself. This is because it is desirable to minimize the size and power

supply requirements of the electronic pen 10, which will likely be adversely affected by the processing resources and memory necessary to support the functions of the electronic pen client 22.

Referring now to FIGURE 9, there is illustrated a block diagram of a state machine for the electronic pen client 22. Initially, the electronic pen client 22 is in a no application loaded state 80. The electronic pen client 22 recognizes only one signal when in this state 80, namely a new grid request from the electronic pen 10. Such a request causes a load grid indication event 82. The electronic pen client 22 responds by sending a request to the name server 26 to translate a position contained within the new grid request into a URL where the application description can be found (i.e., in accordance with the find application location procedure). Next, the electronic pen client 22 enters a waiting for application description URL state 84. If no URL for the application description can be found (as indicated at 86), the electronic pen client 22 sends a new grid reply to the electronic pen 10, wherein the reply contains an empty grid description with a grid exception. As a result, the

electronic pen client 22 returns to the no application loaded state 80.

If a URL for the application description is received from the name server 26 (as indicated at 88), the electronic pen client 22 sends a request to the application server 30 to retrieve the application description (i.e., in accordance with the get application description procedure). Accordingly, the electronic pen client 22 enters a waiting for application description state 90.

If the electronic pen client 22 does not receive an application description from the application server 30 (as indicated at 92), a new grid reply is sent by the electronic pen client 22 to the electronic pen 10 wherein the reply contains an empty grid. Thus, the electronic pen client 22 returns to the no application loaded state 80. If, however, the electronic pen client 22 does receive an application description from the application server 30 (as indicated at 94), the electronic pen client 22 sends a new grid reply to the electronic pen 10 containing a new grid description, and the electronic pen client 22 loads the application in its memory. In

addition, the electronic pen client 22 moves into an application loaded state 96.

In the application loaded state 96, five types of actions can be received by the electronic pen client 22 from the electronic pen 10. First, a received action can include a request that the electronic pen client 22 cannot handle itself, in which case the electronic pen client 22 will send the action to the base translator 28 (as indicated at 98). The electronic pen client 22 then moves into a waiting for response from the base translator state 100. Once a base translator response 102 is received by the electronic pen client 22, the electronic pen client 22 updates a current form or other data associated with the currently loaded application and sends an action reply to the electronic pen 10 with appropriate output information.

Another type of action that the electronic pen client 22 can receive from the electronic pen 10 is a request that should be forwarded to a control node 24. In such a case, the action is sent to a control URL specified in the application description (as indicated at 104), and the electronic pen client 22 enters a waiting for response from the control state 106. Once a response is received from the control (as indicated at 108), the electronic pen

client 22 sends an action reply to the electronic pen 10 with appropriate output information.

A third type of action is a submit form request, in response to which the electronic pen client 22 will submit the current form to the application server 30 that is identified by the URL in the application description (as indicated at 110). The electronic pen client 22 then enters a waiting for response from the application server state 112. If the application server 30 responds by sending an empty application description to the electronic pen client 22 (as indicated at 114), the current application is unloaded from the electronic pen client 22 and an action reply is sent to the electronic pen 10 with an empty grid. As a result, the electronic pen client 22 returns to the no application loaded state 80. On the other hand, if the application server 30 responds with a non-empty application description, the old application is unloaded from the electronic pen client 22, the new application description is parsed and loaded in the electronic pen client 22, an action reply is sent to the electronic pen 10 with a new grid description and with appropriate output information, and finally the electronic pen client 22 returns to the application loaded state 96.

A fourth type of action that can be received by the electronic pen client 22 from the electronic pen 10 is a request to load a new grid. This action occurs, for example, when a position outside of the current grid is detected by the electronic pen 10. When a new grid request is received, the electronic pen client 22 sends a request to the name server 26 (as indicated at 116) and the electronic pen client 22 returns to the waiting for application description URL state 84.

Finally, a fifth type of action that can be received by the electronic pen client 22 is an action that the electronic pen client 22 can handle itself, in which case the electronic pen client 22 updates the current form and sends an action reply to the electronic pen 10 with appropriate output information (as indicated at 118). The electronic pen client 22 then remains in the application loaded state 96. One type of action that the electronic pen client 22 might be able to handle itself is a local application. For example, the electronic pen client 22 might be capable of performing certain basic functions that are defined by a local application. Thus, when the electronic pen client 22 receives a new grid request, the position associated with the new grid request can be

analyzed to determine if it corresponds to a local application. If so, the electronic pen client 22 can load the application description from its local memory, send a new grid description to the electronic pen 10 without having to communicate with the name server 26 or the application server 30.

Another action that might be handled locally by the electronic pen client 22 relates to the selection of fields within a form. When the electronic pen client 22 receives an action, the field that corresponds to that action receives focus. When this occurs, the electronic pen client 22 might display the field's value on its display or output the value by audio. In addition, the electronic pen client 22 might allow the user to edit the value of the field by means other than the electronic pen 10. Yet another type of action that might be handled by the electronic pen client 22 itself are actions that relate to a clipboard function. When a "copy" field is selected, the value of the field that had focus at the time the copy field was selected is transferred to the clipboard. Similarly, when a "paste" field is selected, the value stored in the clipboard is transferred to the

field that had focus at the time the paste field was selected.

Referring now to FIGURES 10A through 10C, there is shown, by way of example, a message flow and signaling diagram illustrating the operation of the electronic pen system 2 depicted in and discussed in connection with FIGURE 2. Initially, the electronic pen 10 detects a first position on the address pattern at step 120 (e.g., at a location on a sheet of paper designated for composing and sending e-mails). At this stage, it is assumed that the electronic pen 10 is in a no grid loaded state. Thus, in response to the detection of the first position, the electronic pen 10 sends a new grid request 122, which contains the detected position information, to the electronic pen client 22. As a result, the electronic pen client 22 sends an application location request 124 containing the detected position information to the name server 26, at step 126. The name server 26 translates the detected position into a URL where an application description that corresponds to the detected position can be found (e.g., a URL address for a server containing an e-mail application), and returns an application location

reply 128 containing the retrieved URL to the electronic pen client 22.

The electronic pen client 22 then sends an application description request 130, which contains the unique pen ID for the electronic pen 10, to the application server 30. The application server 30 retrieves the application description at step 132 and sends an application description reply 134 containing the retrieved application description to the electronic pen client 22. The electronic pen client 22 then parses and stores the application description at step 136. This step further involves generating a current grid description from the application description and sending the grid description to the electronic pen 10 in a new grid reply 138. The electronic pen 10 stores the received grid description at step 140 and resumes processing of the detected positions. Using the detected positions and the information in the grid description (e.g., so that the electronic pen 10 knows which fields of the e-mail form are being filled in), the electronic pen 10 generates strokes at step 142 and generates actions at step 144 using the stroke engine 52 and action engine 56 shown in FIGURE 7.

Each time an action is generated that cannot be handled by the electronic pen 10 itself, an action request 146 containing a description of the action is sent from the electronic pen 10 to the electronic pen client 22. At this point, the electronic pen client 22 should determine what type of action has been received so that it can respond to the action in an appropriate manner. First, it is determined whether the action requires the attention of, or otherwise should be processed in accordance with, a local application at step 148. Very basic applications or frequently used applications (e.g., delete entered text), for example, might be stored locally to avoid having to contact another entity. In such a case, the electronic pen client 22 retrieves the local application at step 150 and sends an action reply 152, which can contain a new grid description or other appropriate information.

However, if it is determined at step 148 that the received action does not relate to a local application, the process continues at step 154 where it is determined whether the received action requires processing by an external translator (e.g., handwriting recognition). If so, an action request 156 containing a description of the action is sent by the electronic pen client 22 to the base

translator 28. The base translator 28 processes the action at step 158 and sends an action reply 160 containing output information responsive to the received action (e.g., text corresponding to written characters) to the electronic pen client 22, which can forward the output information to the electronic pen 10 in an action reply 162, if necessary.

If it is determined at step 154 that the received action does not require processing by an external translator, it is next determined whether the action relates to a control application at step 164. If so, an action request 166 containing a description of the action is sent by the electronic pen client 22 to the control server 24. The control server 24 processes the received action at step 168 and, if a response is necessary, returns output information responsive to the received action in an action reply 170, which is forwarded from the electronic pen client 22 to the electronic pen 10 in an action reply 172.

Assuming that it is determined at step 164 that the received action does not relate to a control function, it is next determined whether the action comprises a request to submit a form at step 174 (e.g., a selection of a

"send" area on the e-mail form). If so, an action request 176 containing the data entered onto the form is sent by the electronic pen client 22 to the application server 30. The application server 30 processes the form at step 178 and sends an action reply 180 containing a new application description (or an empty application description) to the electronic pen client 22. The electronic pen client 22 parses and stores the new application description at step 182 and generates a new grid description from the newly received application description. The electronic pen client 22 then sends an action reply 184 containing the new grid description. Although not illustrated in the figure, the electronic pen 10 will typically respond to the receipt of a new grid description by unloading its current grid description and loading the new grid description into its memory.

At some point, it is assumed that the electronic pen 10 detects a position that is outside of the currently loaded grid at step 186. In response to such an event, the electronic pen 10 sends a new grid request 188 containing the newly detected position data to the electronic pen client 22. In response, the electronic pen client 22 again generates an application location request

190 containing the detected position data and sends the request to the name server 26. The name server 26 determines whether a URL for an application description that corresponds to the newly detected position is available at step 192.

If so, the name server 26 sends an application location reply 194 containing a retrieved URL to the electronic pen client 22, which in turn sends an application description request 196 containing the unique pen ID for the electronic pen 10 to the application server 30 at the identified URL address, just as previously discussed in connection with messages 128 and 130. In this case, however, it is assumed that the application server 30 determines that the requested application description is unavailable at step 198. As a result, the application server 30 sends an application description reply to the electronic pen client 22 containing an empty application description. In response to the receipt of an empty application description, the electronic pen client 22 unloads the current application at step 202 and sends a new grid reply 204 containing an empty grid description to the electronic pen 10. The electronic pen 10 responds to

the receipt of the empty grid description by unloading the current grid description at step 206.

Another possibility is that the name server 26 determines at step 192 that a URL corresponding to the detected position is not available. In this situation, the name server 26 sends an application location reply 208 to the electronic pen client 22. The reply 208 may simply be empty to indicate that a URL is not available. Preferably, however, the reply 208 contains a grid exception defining the largest area possible around the detected position for which there is no corresponding URL. In response to the reply 208, the electronic pen client 22 sends a new grid reply 210 containing an empty grid description with a grid exception. Upon receiving the reply 210, the electronic pen 10 unloads the current grid description at step 212. Furthermore, assuming that the electronic pen 10 receives and recognizes the grid exception information, the electronic pen 10 may subsequently be able to determine that certain detected positions on the address pattern are not associated with any application without having to send a request to the name server 26 or the application server 30.

In accordance with the present invention, an electronic pen 10 can be used in connection with a specially formatted paper 12 to provide both navigation and input to any type of electronic device. For example, a particular sheet of paper can be associated with a specific electronic device. Different areas on the paper can be associated with different functions. The paper might have an area or field for drawing input, an area or field for text input, an area that is divided into special functional buttons necessary for the associated electronic device, and an area or field for navigation. Which of the fields the electronic pen 10 is pointing at can be determined by using a built-in camera or other optical detector in the electronic pen 10 to detect a portion of the address pattern on the paper. Similarly, the exact position or movement of the electronic pen 10 within a particular field can also be determined by detecting only a small portion of the address pattern that is adjacent to the tip of the electronic pen 10 as it is used to write, draw, or otherwise contact the paper. Moreover, when the electronic pen 10 is used for text input, character recognition can be performed in the electronic pen 10, in

an electronic device associated with the electronic pen 10 or the particular sheet of paper, or in a server.

Referring now to FIGURE 11, there is illustrated an example of a specially formatted paper 220 for PC navigation and input. By using the paper 220 together with an electronic pen 10, both the keyboard and mouse can either be replaced or their functionalities can be emulated. The specially formatted paper 220 includes an address pattern, as discussed above, such that the precise position of the electronic pen 10 on the paper 220 can be determined by detecting a small portion (e.g., a 2 mm by 2 mm area) of the address pattern. The formatted paper 220 further includes various fields for use in performing different functions, including a drawing area 222, a text input area 224, a navigation area 226, and a number of functional keys 228 (e.g., Insert, Home, Return, Backspace, and the like).

When the electronic pen 10 is used within the navigation area 226, it emulates the functions of a mouse. Thus, the cursor or pointer on the PC screen follows the movements of the electronic pen 10. Execution of a mouse "click" can be done by touching the electronic pen 10 to a click field (e.g., in the functional key area 228), by

optical or pressure sensitive detectors on the electronic pen 10, or by a click button on the electronic pen 10. In addition, other types of special fields might be included on the paper 220, such as a scrolling bar for performing scrolling functions or directional arrows for moving a cursor or pointer on the PC screen in specific directions.

To perform other types of PC input, the other fields on the specially formatted paper 220 can be used. The text input area 224 is used for writing characters that are interpreted by character recognition software in the electronic pen 10 or in the PC. Alternatively, a QWERTY or other type of keyboard can be included on the formatted paper 220. Special functional fields 228 can also be included for performing PC specific functions, such as Insert, Delete, Home, and the like. Furthermore, drawing input is performed using the drawing area 222. Preferably, the drawing area is kept separate from the navigation area 226 and the text input area 222 so that an ink version of the drawing, in addition to an electronically stored version, can be kept intact, if so desired.

Referring now to FIGURE 12, there is depicted an illustrative example of a specially formatted paper 230

for cellular phone navigation and input. The formatted paper 230 can either be a separate paper or part of the cellular phone. Such a formatted paper 230 can replace or emulate the function of a touchscreen, a chatboard, or a traditional keyboard. The specially formatted paper 230 again includes an address pattern that facilitates determining a precise location of the electronic pen 10 on the formatted paper 230. In addition, the specially formatted paper includes a drawing area 232, a text input area 234, a navigation area 236, a phone keyboard area 238, and a number input area 240.

When the electronic pen 10 is used in the navigation area 236, it can perform the same function as a mouse (i.e., moving a cursor or pointer that is displayed on a cellular phone display screen) or can perform a two or four way scroll function. Other special navigation fields could also be included for performing WAP browser navigation or fast menu access (e.g., a phone book button).

The electronic pen 10 can also be used in the text input area 234 and the drawing area 232 to input handwritten text and handwritten images, respectively. Such handwritten input can be converted into ASCII text or

interpreted as a command to perform some other function by handwriting recognition software in the electronic pen 10, in the phone, or in a server. Similarly, phone numbers can dialed by writing the number in a number output area 240. Alternatively or in addition, special fields can be included to emulate the function of a complete phone keyboard (i.e., by touching the electronic pen 10 in a field corresponding to each of the digits in a phone number and then touching a "yes" field, a phone number can be dialed). Accordingly, all of the functions, and possibly more, that can be performed with existing phone MMIs can instead be done using an electronic pen 10 and a sheet of paper 230 designed for performing phone control functions but in a simpler and more convenient manner.

Referring now to FIGURE 13, there is illustrated an electronic pen 10 for use in performing an advanced joystick functionality. In this case, a certain part of the overall address pattern reserved for use in emulating joystick functions is printed on a formatted paper 242. By using the electronic pen 10 in the joystick area, movements of the electronic pen 10 can be translated into joystick motions and communicated to a game console or PC for use as an application MMI.

In a preferred embodiment, for example, the joystick functionality is enabled when the electronic pen 10 is placed vertically in the joystick area 242. Thereafter, when the electronic pen 10 is moved, tilted, or rotated while the tip 244 of the electronic pen 10 is in contact with the formatted paper 242, a sensor or camera in the electronic pen 10 can detect a portion of the address pattern adjacent to the electronic pen 10. The detected portion of the address pattern can then be converted, by processing address pattern images detected by the sensor or camera, into data identifying: the current position of the electronic pen 10 relative to the address pattern; the rotation angle of 0 to 360 degrees (as indicated at 246); the tilt angle of 0 to 90 degrees (as indicated at 248); and the amount of pressure between the electronic pen tip 244 and the formatted paper 242. This data can then be sent to a controlled device at a specified update rate to control, for example, an object in a game (e.g., a plane in a flight simulator game).

In accordance with the invention, a system that includes an electronic pen 10, or other similar general reading device, and a specially formatted (i.e., addressed) paper 220 or 230 can be used to control any

electronic device to: (i) execute applications associated with the paper 220 or 230 on an electronic device capable of communicating with the electronic pen 10; (ii) implement the application MMI for an electronic device; (iii) navigate on an electronic device; and/or (iv) facilitate text, drawing, or functional input to an electronic device. Furthermore, special functionalities in the electronic pen 10 or formatted paper 220 or 230 can permit emulation of a mouse click, a touchscreen tap or motion, pressing of a functional or input key, and/or other graphical user interface (GUI) functions, such as a scroll bar.

Although the invention is described in connection with examples of PC, game console, and cellular phone control functions, the invention can also be used to control the electronic pen itself, a PDA, calculator, digital camera, and any other electronic device. Moreover, the invention can be used to emulate or replace the functions of virtually any type of MMI, including a mouse, a keyboard, a touchscreen and stylus, a numeric keypad, a gamepad, and the like.

Although various preferred embodiments of the method and apparatus of the present invention have been

illustrated in the accompanying Drawings and described in the foregoing Detailed Description, it is understood that the invention is not limited to the embodiments disclosed, but is capable of numerous rearrangements, modifications, and substitutions without departing from the spirit of the invention as set forth and defined by the following claims. Furthermore, it shall be understood that the terms "comprises" and "comprising," when used in the foregoing Detailed Description and the following claims, specifies the presence of stated features, elements, steps, or components but does not preclude the presence or addition of one or more other features, elements, steps, components, or groups thereof.

WHAT IS CLAIMED IS:

1. A system for controlling an electronic device, comprising:

an electronic device;

a specially formatted surface, including a predefined address pattern and at least one field for use in performing a control function on the electronic device; and

an address pattern reading device for detecting a portion of the predefined address pattern adjacent to the reading device, wherein a position of the reading device on the specially formatted surface can be determined using the detected portion of the predefined address pattern.

2. The system of claim 1, wherein the electronic device includes the reading device.

3. The system of claim 1, wherein the reading device comprises an electronic pen separate from the electronic device.

4. The system of claim 1, wherein the at least one field comprises at least one of a navigation field for controlling navigation on the electronic device, a text input field for controlling text input to the electronic device, a drawing input field for controlling drawing input to the electronic device, and a special function field for executing a special function on the electronic device.

5. The system of claim 1, wherein the specially formatted surface comprises a paper having a plurality of fields corresponding to at least one application, said at least one application executable on the electronic device in accordance with positions on the paper detected by the reading device.

6. The system of claim 1, wherein the specially formatted surface and the reading device comprise at least a portion of a man-machine interface for the electronic device.

7. The system of claim 1, wherein the at least one field comprises a navigation field and the electronic device further includes a display screen, the display screen displaying a cursor, wherein a location of the cursor is based on at least one detected position of the reading device within the navigation field.

8. The system of claim 7, wherein a selection of a current location of the cursor is performed by a selection function, the selection function selected from the group consisting of a detection by the reading device of a portion of the address pattern within a selection field on the specially formatted surface, a pressure sensitive detection on the reading device, and a pressing of a button on the reading device.

9. The system of claim 1, wherein the use of the reading device on the specially formatted surface facilitates an input of handwritten text to the electronic device.

10. The system of claim 1, wherein use of the reading device on the specially formatted surface facilitates an input of a drawing to the electronic device.

11. The system of claim 1, wherein the at least one field comprises a functional input field for controlling an execution of a function on the electronic device.

12. The system of claim 1, wherein the specially formatted surface comprises a plurality of fields, each field corresponding to at least one character, a detection by the reading device of a portion of the address pattern within one of the plurality of fields operating to input the corresponding at least one character to the electronic device.

13. The system of claim 1, wherein the reading device includes a transmitter for communicating with the electronic device.

14. The system of claim 13, wherein the transmitter transmits information to the electronic device via at least one of a cable and a local wireless link.

15. The system of claim 13, wherein the transmitter operates in accordance with Bluetooth radio interface technology.

16. The system of claim 1, wherein the electronic device is selected from the group consisting of a mobile phone, a computer, a personal digital assistant, a calculator, a game console, a television, and a digital camera.

17. The system of claim 1, wherein use of the reading device on the specially formatted surface facilitates a joystick functionality.

18. A method for controlling an electronic device, comprising the steps of:

detecting at least one position, using a reading device, on a specially formatted surface having an address pattern by detecting a portion of the address pattern adjacent to the reading device;

identifying a function corresponding to the at least one detected position; and

performing the identified function on an electronic device.

19. The method of claim 18, wherein the detected portion of the address pattern is located within a field on the specially formatted surface, said field corresponding to the function.

20. The method of claim 18, wherein the identified function comprises navigating on the electronic device.

21. The method of claim 18, wherein the identified function relates to an application loaded on the electronic device.

22. The method of claim 18, wherein the identified function comprises an input of handwritten text.

23. The method of claim 22, further comprising the step of converting the handwritten text input into text characters.

24. The method of claim 18, wherein the identified function comprises an input of a character corresponding to the detected position.

25. The method of claim 18, wherein the identified function comprises an input of a drawing.

26. The method of claim 18, further comprising the step of detecting a selection of a location on the specially formatted surface, wherein the step of identifying the function is performed in response to the detected selection.

27. The method of claim 26, wherein the selection is detected by sensing a pressure on the reading device.

28. The method of claim 26, wherein the selection is detected by sensing a pressing of a button on the reading device.

29. The method of claim 18, further comprising the step of transmitting information relating to the at least one detected position from the reading device to the electronic device.

30. The method of claim 18, further comprising the step of translating the at least one detected portion of the address pattern into a rotation angle.

31. The method of claim 18, further comprising the step of translating the at least one detected portion of the address pattern into a tilt angle.

ABSTRACT OF THE DISCLOSURE

A method and system for controlling an electronic device uses a reading device and a specially formatted surface. The specially formatted surface includes a predefined address pattern and at least one field for use in performing a control function on the electronic device. By detecting a portion of the address pattern that is adjacent to the reading device, a position of the reading device can be determined. Furthermore, by repeatedly detecting portions of the address pattern, movement of the reading device relative to the address pattern can also be determined. When a detected position or movement is within a control field, a corresponding control function can be performed on the electronic device.

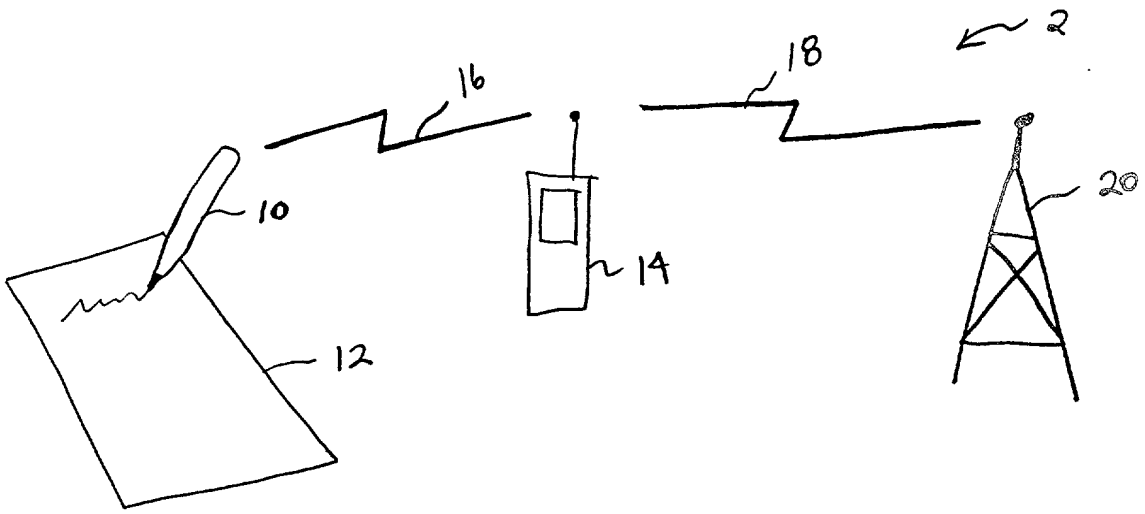
2
16
18
10
14
20
12

FIG. 1

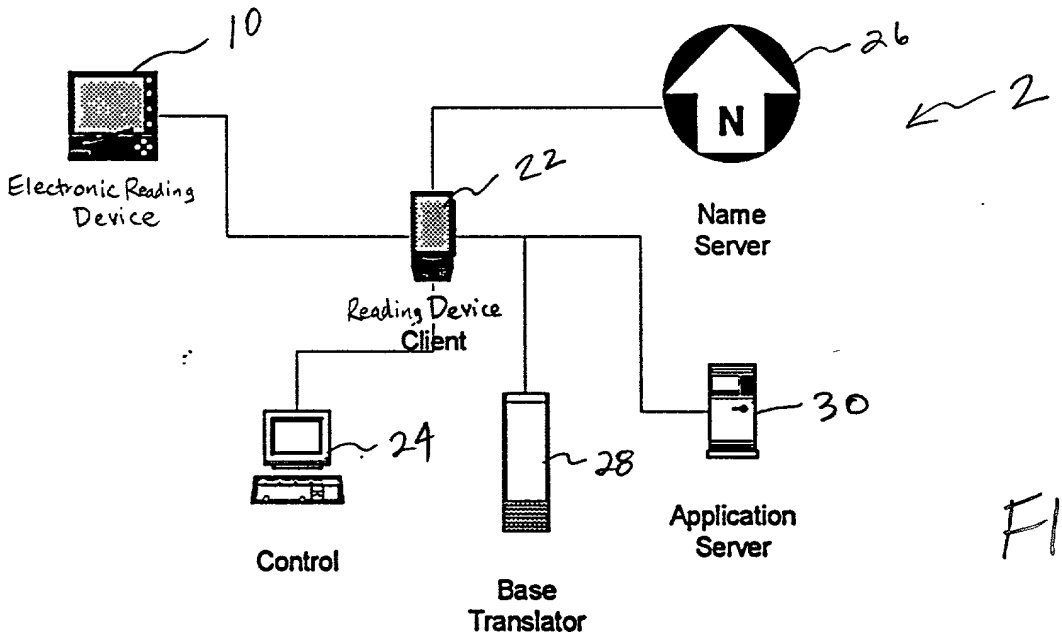
10
26
N
2
Electronic Reading Device
22
Name Server
Reading Device Client
24
30
28
Application Server
Control
Base Translator

FIG. 2

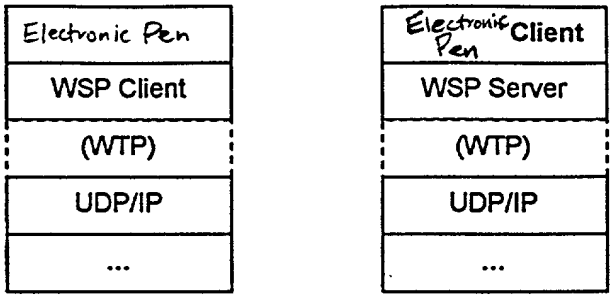

FIG. 3

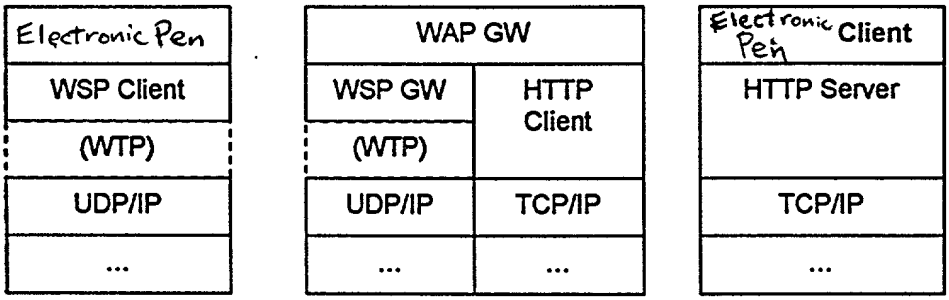

FIG. 4

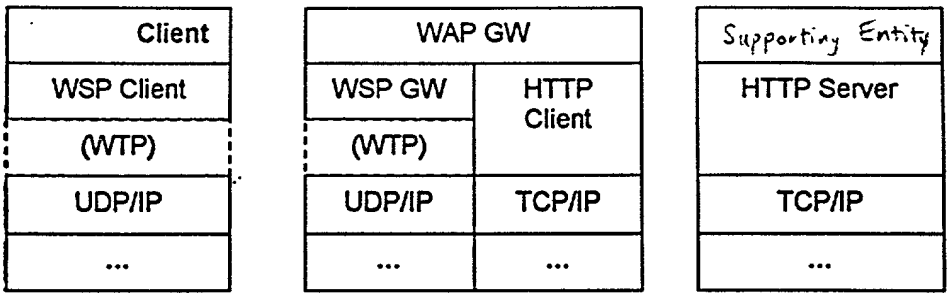

FIG. 5

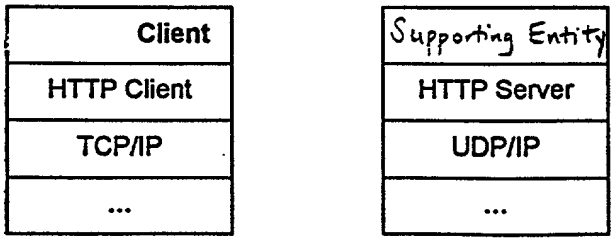

FIG. 6

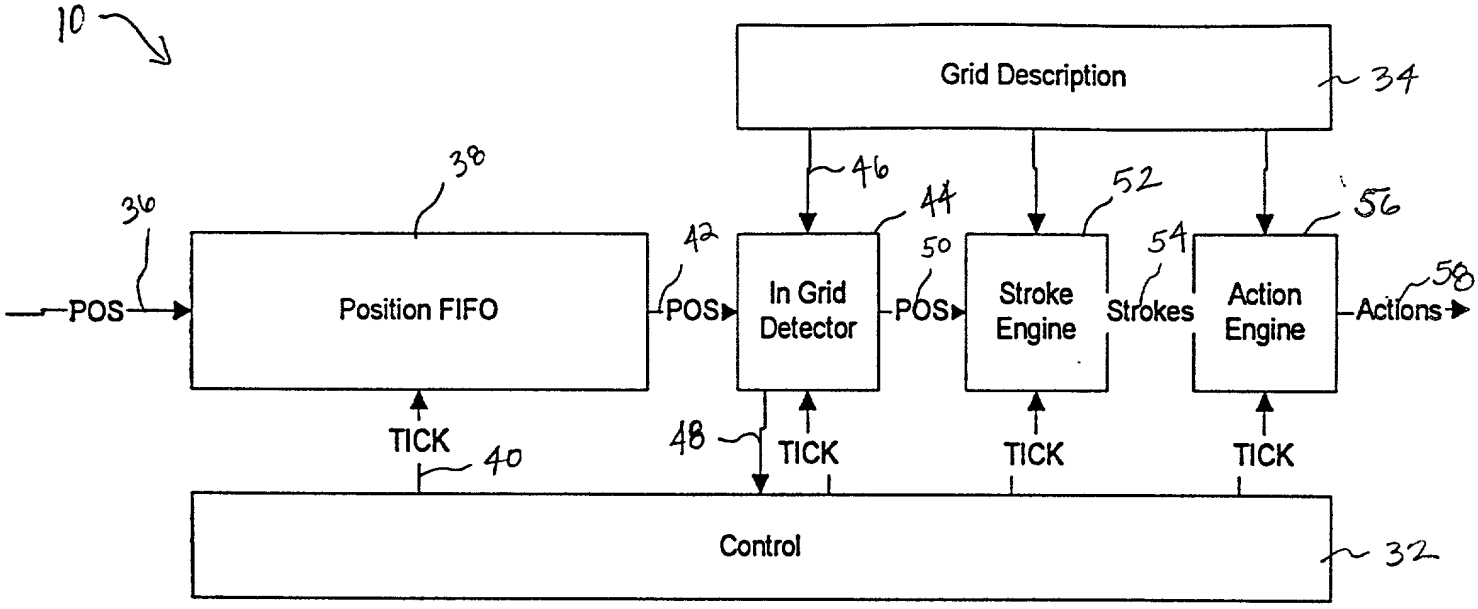
10
Grid Description
34
46
44
52
56
38
36
42
50
54
58
POS
Position FIFO
POS
In Grid Detector
POS
Stroke Engine
Strokes
Action Engine
Actions
TICK
40
48
TICK
TICK
TICK
Control
32

FIG. 7

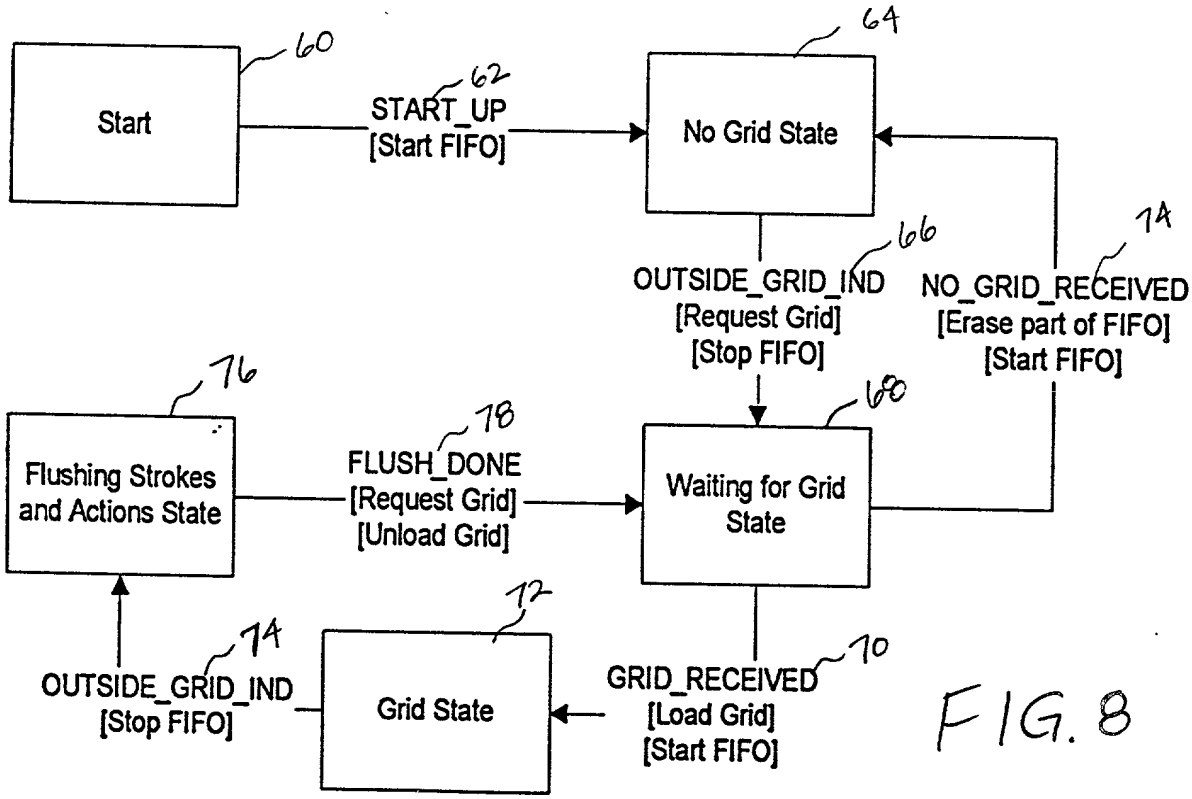
Start
60
START_UP
[Start FIFO]
62
No Grid State
64
OUTSIDE_GRID_IND
[Request Grid]
[Stop FIFO]
66
NO_GRID_RECEIVED
[Erase part of FIFO]
[Start FIFO]
14
Flushing Strokes and Actions State
76
FLUSH_DONE
[Request Grid]
[Unload Grid]
78
Waiting for Grid State
68
OUTSIDE_GRID_IND
[Stop FIFO]
74
Grid State
72
GRID_RECEIVED
[Load Grid]
[Start FIFO]
70

FIG. 8

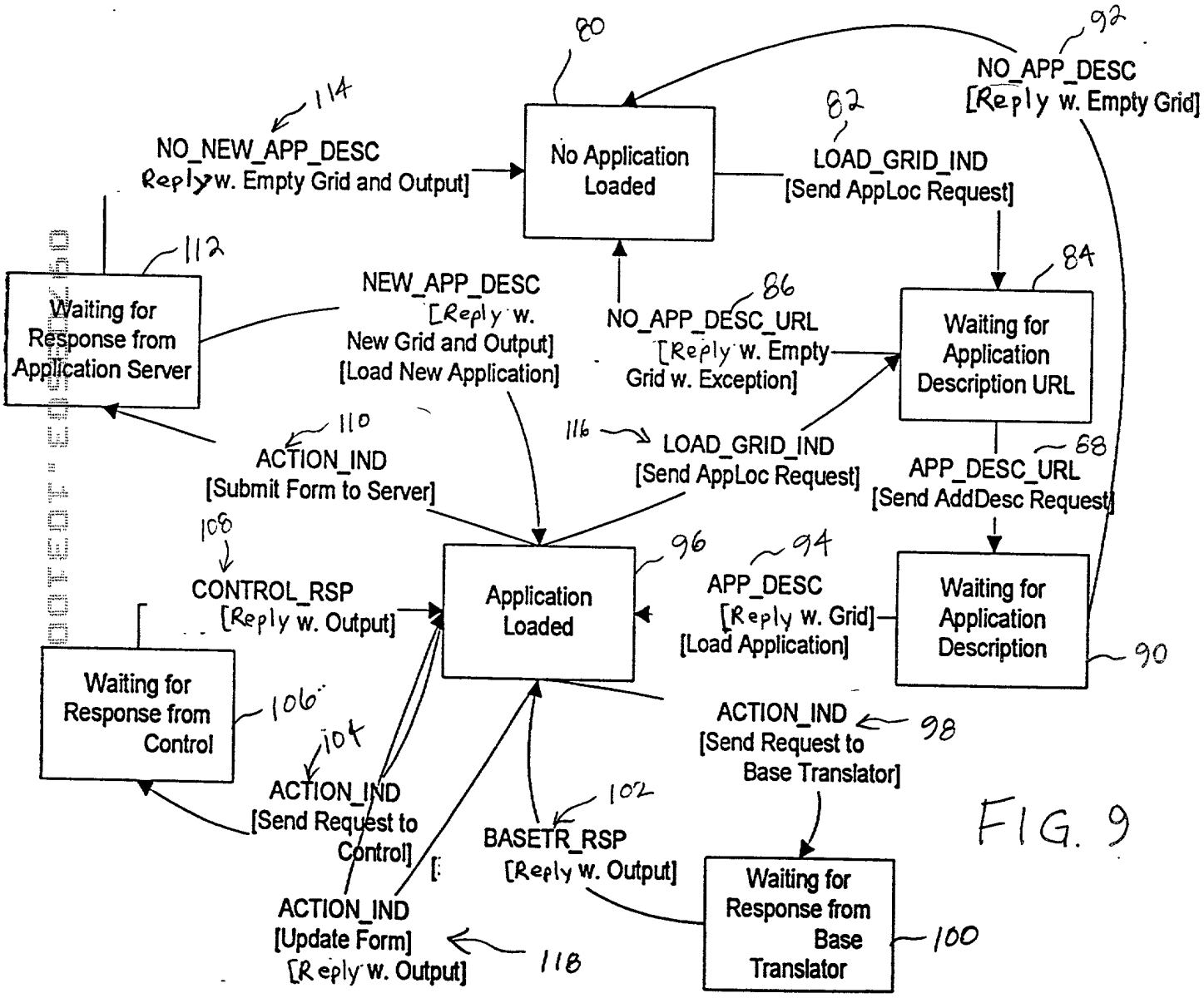
80
92
NO_APP_DESC
[Reply w. Empty Grid]
114
NO_NEW_APP_DESC
Reply w. Empty Grid and Output]
No Application Loaded
82
LOAD_GRID_IND
[Send AppLoc Request]
112
84
Waiting for Response from Application Server
NEW_APP_DESC
[Reply w. New Grid and Output]
[Load New Application]
86
NO_APP_DESC_URL
[Reply w. Empty Grid w. Exception]
Waiting for Application Description URL
110
ACTION_IND
[Submit Form to Server]
116
LOAD_GRID_IND
[Send AppLoc Request]
68
APP_DESC_URL
[Send AddDesc Request]
108
CONTROL_RSP
[Reply w. Output]
96
Application Loaded
94
APP_DESC
[Reply w. Grid]
[Load Application]
Waiting for Application Description
90
Waiting for Response from Control
106
104
ACTION_IND
[Send Request to Control]
ACTION_IND
[Send Request to Base Translator]
98
102
BASETR_RSP
[Reply w. Output]
Waiting for Response from Base Translator
100
ACTION_IND
[Update Form]
[Reply w. Output]
118

FIG. 9

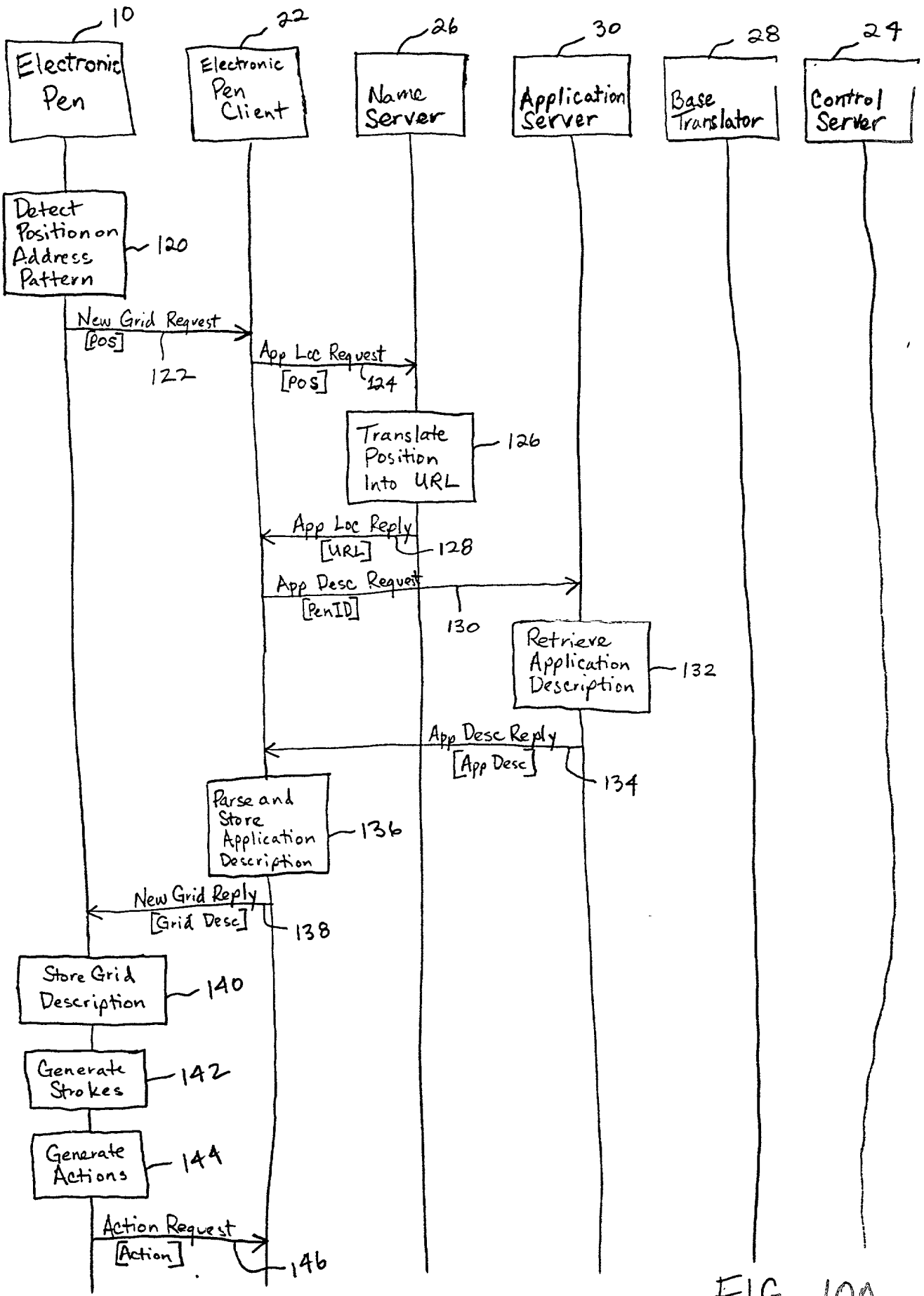
10
Electronic Pen
22
Electronic Pen Client
26
Name Server
30
Application Server
28
Base Translator
24
Control Server
Detect Position on Address Pattern
120
New Grid Request
[Pos]
122
App Loc Request
[Pos]
124
Translate Position Into URL
126
App Loc Reply
[URL]
128
App Desc Request
[PenID]
130
Retrieve Application Description
132
App Desc Reply
[App Desc]
134
Parse and Store Application Description
136
New Grid Reply
[Grid Desc]
138
Store Grid Description
140
Generate Strokes
142
Generate Actions
144
Action Request
[Action]
146

FIG. 10A

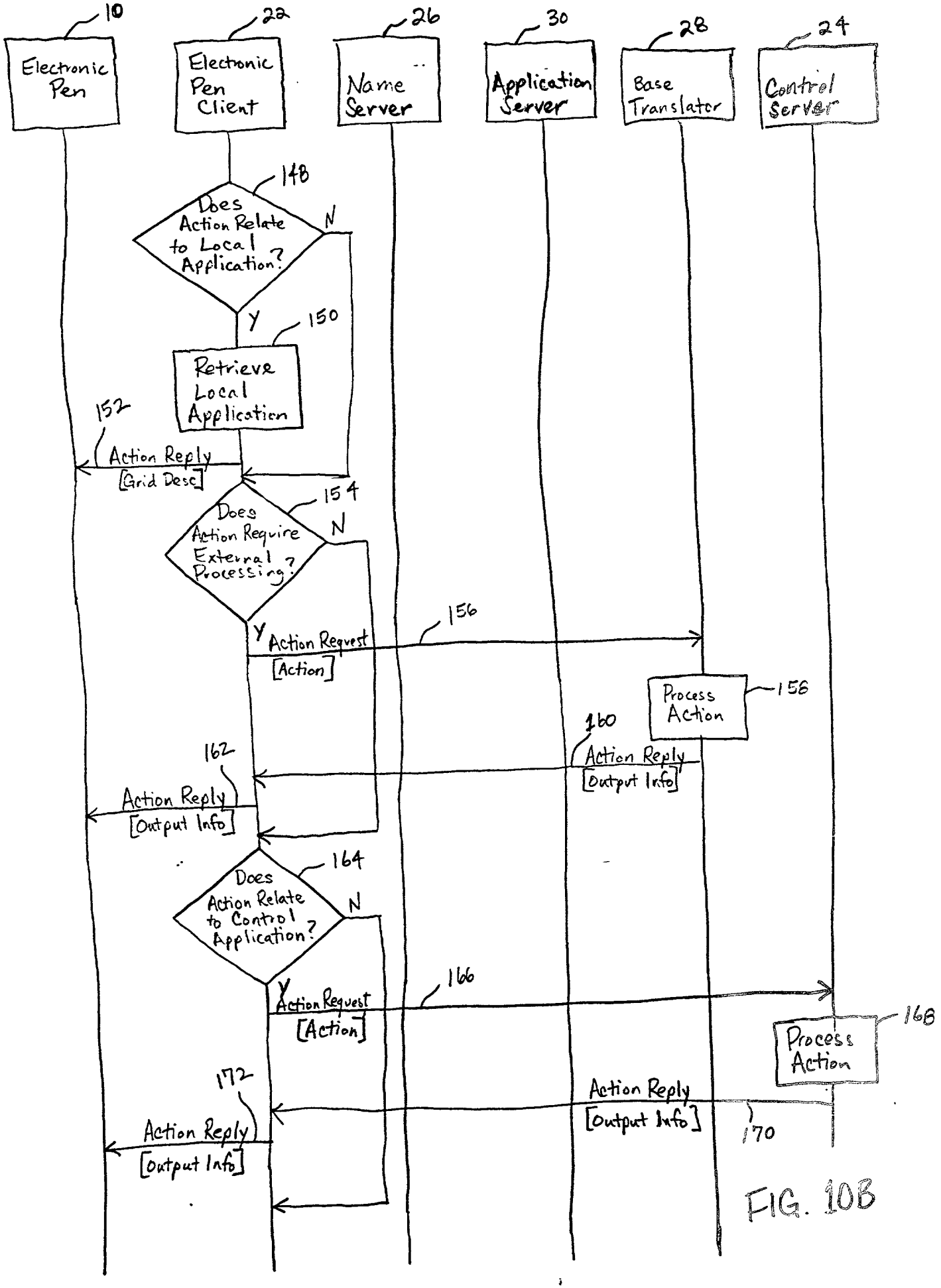
10
Electronic Pen
22
Electronic Pen Client
26
Name Server
30
Application Server
28
Base Translator
24
Control Server
148
Does Action Relate to Local Application?
N
Y
150
Retrieve Local Application
152
Action Reply
[Grid Desc]
154
Does Action Require External Processing?
N
Y
Action Request
[Action]
156
Process Action
158
160
Action Reply
[Output Info]
162
Action Reply
[Output Info]
164
Does Action Relate to Control Application?
N
Y
Action Request
[Action]
166
Process Action
168
172
Action Reply
[Output Info]
Action Reply
[Output Info]
170

FIG. 10B

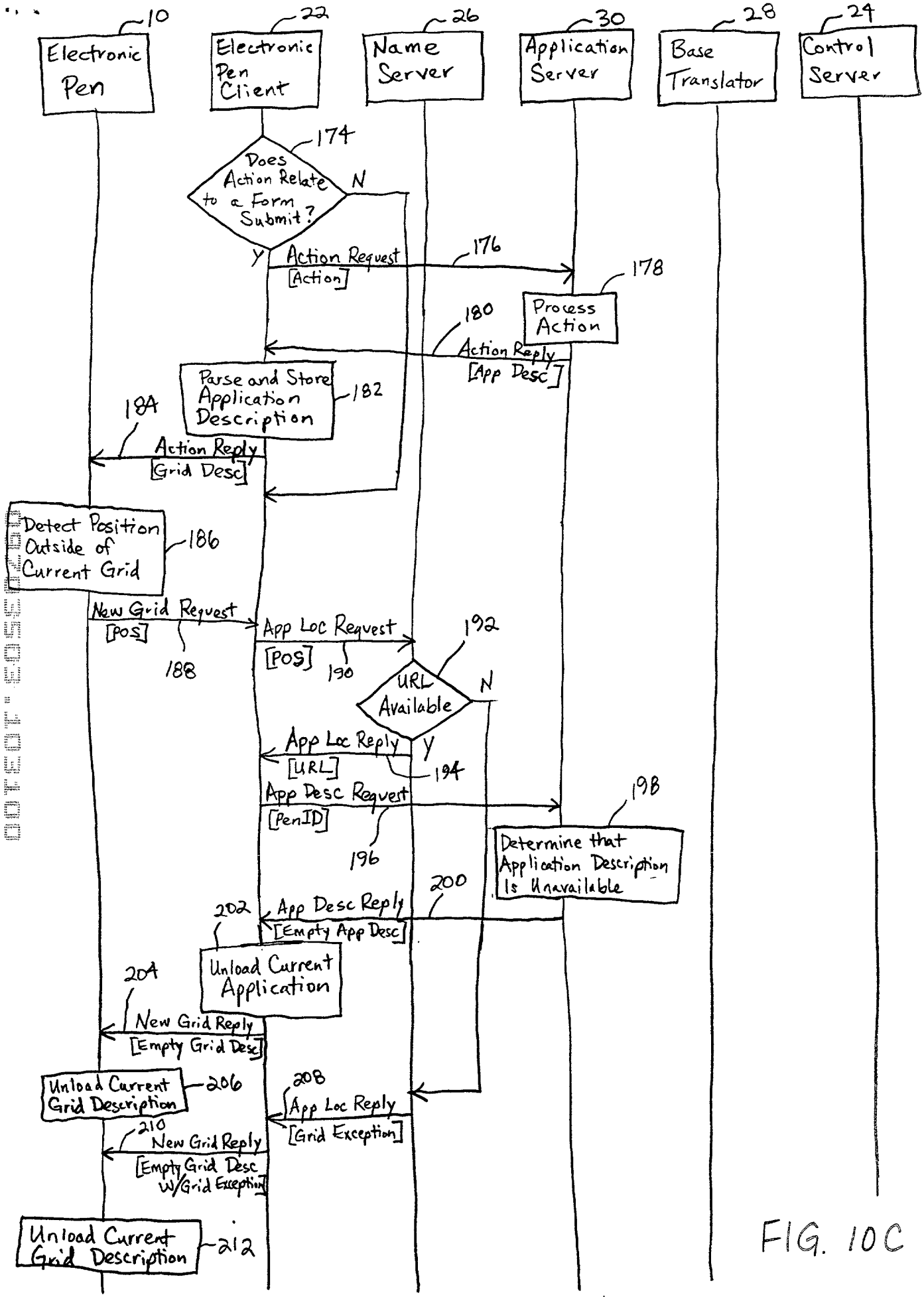
10
Electronic Pen
22
Electronic Pen Client
26
Name Server
30
Application Server
28
Base Translator
24
Control Server
174
Does Action Relate to a Form Submit?
N
Y
Action Request
[Action]
176
178
Process Action
180
Action Reply
[App Desc]
Parse and Store Application Description
182
184
Action Reply
[Grid Desc]
Detect Position Outside of Current Grid
186
New Grid Request
[POS]
188
App Loc Request
[POS]
190
192
URL Available
N
Y
App Loc Reply
[URL]
194
App Desc Request
[PenID]
196
198
Determine that Application Description Is Unavailable
200
App Desc Reply
[Empty App Desc]
202
Unload Current Application
204
New Grid Reply
[Empty Grid Desc]
Unload Current Grid Description
206
208
App Loc Reply
[Grid Exception]
210
New Grid Reply
[Empty Grid Desc W/Grid Exception]
Unload Current Grid Description
212

FIG. 10C

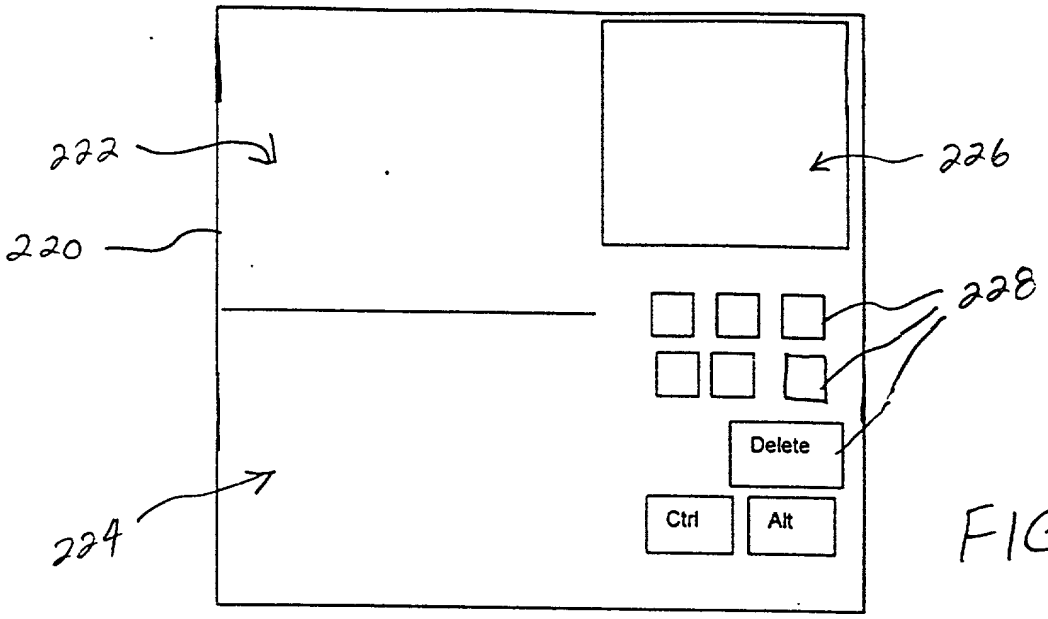
222
226
220
228
Delete
224
Ctrl
Alt

FIG. 11

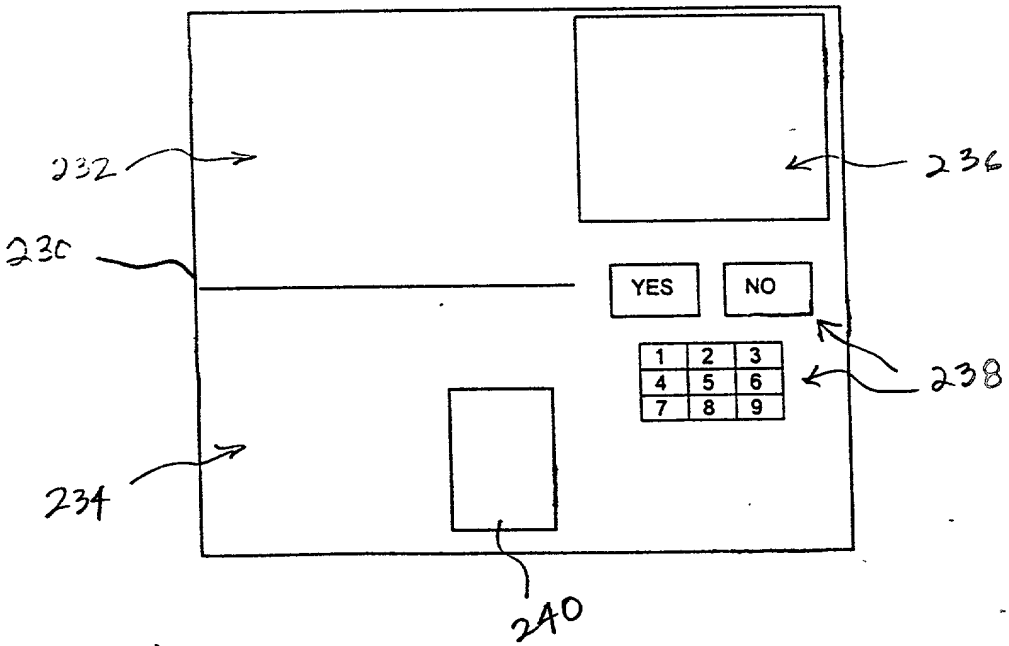
232
236
230
YES
NO
1 2 3
4 5 6
7 8 9
238
234
240

FIG. 12

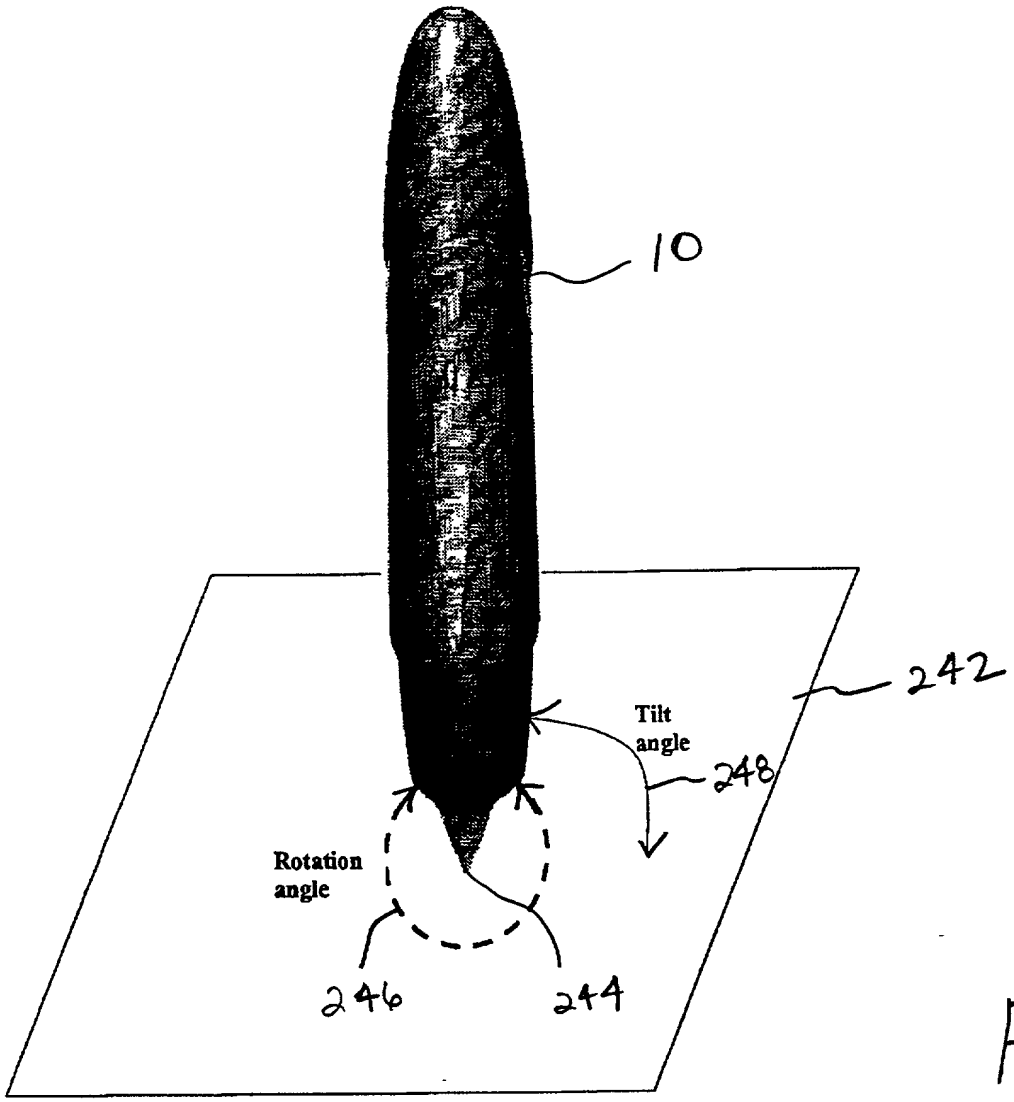

FIG. 13

PATENT APPLICATION
DOCKET NO.: 34650-569PT

RULES 63 AND 67 (37 C.F.R. 1.63 and 1.67)
DECLARATION AND POWER OF ATTORNEY

FOR UTILITY/DESIGN/CIP/PCT NATIONAL APPLICATIONS

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; and

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **METHOD AND SYSTEM FOR USING AN ELECTRONIC READING DEVICE AS A GENERAL APPLICATION INPUT AND NAVIGATION INTERFACE**, the specification of which: (mark only one)

___	(a)	is attached hereto.
__	(b)	was filed on _ as Application Serial No. __ and was amended on _____ (if applicable)
___	(c)	was filed as PCT International Application No. PCT/_____ on ____ and was amended on _____ (if applicable).
__	(d)	was filed on ___ as Application Serial No. ___ and was issued a Notice of Allowance on ____.
X	(e)	was filed on October 31, 2000 bearing attorney docket number 34650-569PT.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above or as allowed as indicated above.

I acknowledge the duty to disclose all information known to me to be material to the patentability of this application as defined in 37 CFR § 1.56. If this is a continuation-in-part (CIP) application, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability of the application as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

I hereby claim foreign priority benefits under 35 U.S.C. § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application

on which my priority is claimed or, (2) if no priority is claimed, before the filing date of this application:

PRIOR FOREIGN PATENTS

Number	Country	Month/Day/Year Filed	Date first laid-open or Published	Date patented or Granted	Priority Claimed Yes	No
NONE						

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATIONS

Application No. (series code/serial no.)	Month/Day/Year Filed
60/182,742	February 16, 2000
60/190,343	March 16, 2000
60/192,662	March 28, 2000

I hereby claim the benefit under 35 U.S.C. § 120/365 of any United States application(s) listed below and PCT international applications listed above or below:

PRIOR U.S. OR PCT APPLICATIONS

Application No. (series code/serial no.)	Month/Day/Year Filed	Status(pending, abandoned, patented)
NONE		

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all of the firm of **JENKENS & GILCHRIST, a Professional Corporation**, 1445 Ross Avenue, Suite 3200, Dallas, Texas 75202-2799, as my attorneys and/or agents, with full power of substitution and revocation, to prosecute this application, provisionals thereof, continuations, continuations-in-part, divisionals, appeals, reissues, substitutions, and extensions thereof and to transact all business in the United States Patent and Trademark Office connected therewith, to appoint any individuals under an associate power of attorney and to file and prosecute any international patent application filed thereon before any international authorities, and I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct them in writing to the contrary.

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214/855-4300 (fax)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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